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(P. M. Barnard)
1916

An ACCOUNT of the

GLACIERES

OR

ICE ALPS

IN

SAVOY,

In TWO LETTERS,

One from an

Engliſh Gentleman to his Friend at *Geneva*;

The other from

PETER MARTEL, Engineer,
to the ſaid *Engliſh* Gntleman.

Illuſtrated with a MAP, and two Views of the PLACE, *&c.*

As laid before the ROYAL SOCIETY.

LONDON,
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(Price One Shilling and Six-pence.)

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A LETTER *from an* Engliſh *Gentleman to Mr.* Arlaud, *a celebrated Painter at* Geneva, *giving an Account of a Journey to the* Glacieres, *or* Ice Alps *in* Savoy, *written in the Year* 1741. *Tranſlated from the* French.

SIR,

ACCORDING to your Deſire I ſend you an Account of our Journey to the *Glacieres*. I ſhall give it you in the plaineſt Manner, without endeavouring to embelliſh it by any florid Deſcriptions, although the Beauty and Variety of the Situations and Proſpects that we obſerved in this unfrequented Part of the World, would well deſerve to be deſcribed by one, who, like you, join to ſo great a Skill in Painting ſo lively and poetical an Imagination; but theſe not being my Talents, I will, as I ſaid before, confine myſelf to the giving you a faithful Relation of the Incidents of our Journey, and acquainting you with the Obſervations we made. I ſhall add a few Hints, which may be uſeful to ſuch as ſhall hereafter have the ſame Curioſity that we had, and who may perhaps have Advantages and Conveniences which we had not to make more accurate Obſervations. It is really Pity that ſo great a Curioſity, and which lies ſo near you, ſhould be ſo little known; for though *Scheuchzer*, in his *Iter Alpinum*, deſcribes the *Glacieres* that are in the Canton of *Berne*, yet they ſeem to me by his Deſcription to be very different from thoſe in *Savoy*.

I had long had a great Deſire to make this Excurſion, but the Difficulty of getting Company had made me defer it: Luckily in the Month of *June* laſt * Dr. *Pococke* arrived at *Geneva* from his Voyages into the *Levant* and *Egypt*, which Countries he had viſited with great Exactneſs. I mentioned to him this Curioſity, and my Deſire to ſee it, and he who was far from fearing Hardſhips, expreſſing a like Inclination, we immediately agreed to go there; when ſome others of our Friends found a Party was made, they likewiſe came into it, and I was commiſſioned to provide what was neceſſary for our ſetting out.

* The ſame who has lately publiſhed ſo accurate and ingenious an Account of his Travels.

As we were aſſured on all hands, that we ſhould ſcarcely find any of the Neceſſaries of Life in thoſe Parts, we took with us Sumpter Horſes, loaded with Proviſions, and a Tent, which was of ſome uſe to us, though the terrible Deſcription People had given us of the Country was much exaggerated. I had provided ſeveral Mathematical Inſtruments to take Heights, and make Obſervations with, hoping that Mr. *Williamſon*, an able Mathematician, Governor to Lord *Hadinton*, would have been of the Party; but he declining it, on account of the Fatigue which he fear'd he ſhould not be able to ſupport, I choſe not to take the Trouble of carrying them, there being no Perſon in the Company ſo capable as he of making a proper uſe of them.

We ſet out from *Geneva* the 19th of *June*, N. S. we were * Eight in Company, beſides five Servants, all of us well arm'd, and our Baggage-Horſes attending us, ſo that we had very much the Air of a Caravan. The firſt Day we went no farther than *Bonneville*, a Town about four Leagues diſtant from *Geneva*, according to the way of reckoning there; theſe four Leagues took us more than ſix Hours riding. This Place is ſituated at the Foot of the *Maule*, and cloſe by the River *Arve*; 'tis ſurrounded with beautiful Meadows and high Mountains, covered with Trees, which form all together a very delightful Situation. There is a very good Stone-Bridge near the Town, but it had ſuffered in the late Innundation of the *Arve*, which had carried away part of it. Our Inn was a tolerable one for *Savoy* as to every thing but Beds.

The next Day being the 20th, we ſet out very early in the Morning, and paſſed the *Arve*; our Road lay between that River and the Mountains, all along which we were entertained with an agreeable Variety of fine Landſkips. They reckon two Leagues from *Bonneville* to *Cluſe*, but we were three Hours and an half in going it.

Cluſe is ſituated in a narrow Paſs between the Mountains, which almoſt meet in this Place [leaving only room for the *Arve*, which is thus hemm'd in for above a League together.] Before you come to *Cluſe* there is a kind of Hermitage, upon a Rock on the Right Hand, where we climb'd up in order to enjoy the Proſpect, which is *delicious*; after that we paſſed the *Arve* over a fine Stone Bridge, of one very large Arch, and continued our Journey for about an Hour and an half through a narrow Road, along the *Arve*, between Rocks

* Viz. Lord *Hadinton*, the Honourable Mr. *Baillie* his Brother, and Meſſ. *Chetwynd*, *Aldworth*, *Pococke*, *Price*, *Windham*, and *Stillingfleet*.

of

of a prodigious Height, which look'd as if they had been ſplit on purpoſe to give the River a Paſſage. Not to mention the Beauty of the Views all along, we were extremely entertained by continual Echoes, and the prodigious rattling, cauſed by cracking a Whip, or firing a Piſtol, which we repeated ſeveral Times. We ſaw Caſcades on every Side, which fell from the Top of high Rocks into the *Arve*. There is one among the reſt of ſingular Beauty, it is called the *Nan d'Arpena*, 'tis a great Torrent, which falls from a very high Rock; all the Company agreed it muſt be higher than * *Saleve*. As for my Part, I will not pretend to decide about it, I however may venture to ſay, that the Caſcade of *Terni* does not fall from near ſo great a Height; but then the Quantity of Water, when we ſaw it, was much leſs than at this laſt mentioned Place; tho' the People of the Country aſſured us, that at certain times the Water is much more abundant than it was then.

After about three Hours riding from *Cluſe*, we came to Saint *Martin*'s Bridge, right againſt *Salanches*, which is on the other Side of the *Arve*. We did not care to go out of our Way into the Town; but choſe rather to encamp in a fine Meadow near the Bridge, in order to refreſh ourſelves. From thence we ſet out again on our Journey, and after four Hours riding through very bad Ways, being obliged to croſs ſome dangerous Torrents, we arrived at a little Village called *Servoz*. Our Horſes ſuffered here very much, being tied to Pickets all Night in the open Air for want of Stabling; beſides, there was neither Oats, nor any other Forrage, but Graſs freſh cut; as for ourſelves, as we had brought all Neceſſaries along with us, we were well enough off, except as to Beds, and that want was ſupplied by clean Straw in a Barn.

From thence we ſet forward at break of Day, and paſſed the *Arve* once more over a very bad wooden Bridge, and after having clim'd over a ſteep Mountain, where we had no ſmall Difficulty with our Horſes, their Shoes coming off continually, and they often running the riſque of tumbling into the *Arve*, which run at the Bottom of the Rock, we came into a pleaſant Valley, where we paſs'd the *Arve* a fourth time over a Stone Bridge, and then firſt had a View of the *Glacieres*. We continued our Journey on to *Chamouny*, which is a Village upon the North-ſide of the *Arve*, in a Valley, where there is a Priory belonging to the Chapter of *Salanches*; here we encamp'd, and while our Dinner

* *Saleve* is a Mountain, about three Miles from *Geneva*, whoſe perpendicular Height is about 1150 *French* Feet.

was preparing, we inquired of the People of the Place about the *Glacieres*. They ſhewed us at firſt the Ends of them which reach into the Valley, and were to be ſeen from the Village; theſe appear'd only like white Rocks, or rather like immenſe Icicles, made by Water running down the Mountain. This did not ſatisfy our Curioſity, and we thought we were come too far to be contented with ſo ſmall a Matter; we therefore ſtrictly inquired of the Peaſants whether we could not by going up the Mountain diſcover ſomething more worth our Notice. They told us we might, but the greateſt Part of them repreſented the Thing as very difficult and laborious; they told us no-body ever went there but thoſe whoſe Buſineſs it was to ſearch for Cryſtal, or to ſhoot * *Bouquetins* and *Chamois*, and that all the Travellers, who had been to the *Glacieres* hitherto, had been ſatisfied with what we had already ſeen.

* The *Bouquetins* are Animals much larger, and leſs Shaggy than a Goat; for their Figure, ſee *Plate* 4. Let. *a*. They live in the higheſt Mountains, and come down very rarely, for which reaſon the Trouble and Danger of Hunting them is very great; they are very courageous, making uſe of their great Horns for Defence, when attack'd; they are very cunning, and by the Wind ſmell the Hunter a vaſt way off; when chaſed, they leap an incredible Diſtance, and being purſued cloſely will throw themſelves down high Precipices, and by falling upon their Horns break their Fall ſo as not to hurt themſelves. The Edges of their Hoofs, or Claws, are ſo ſharp and hard, that the Impreſſion of them may be ſeen on Stones. Their Blood is eſteemed as a ſovereign Remedy in Pleuritick Diſorders, which is reckoned to be owing to the Herbs they feed on in theſe Mountains, particularly an Herb called, in the Language of the Country, *Genepi*. *Chamois* is a Kind of Goat, only ſtronger; for their Figure, ſee *Plate* 4. Let. *b*. They keep on the high Mountains of the *Alps*; they are very fond of licking certain Rocks, of a kind of ſoft crumbling Stone, which is Salt, and in thoſe Places the Hunters go to look for them, and ſurpriſe them, which is however very difficult, for they always have ſome of the Herd ſtanding on high Rocks as Centries, and when they perceive any Danger they give the Alarm by a Noiſe they make, upon which the reſt betake themſelves to the Precipices, where it is impoſſible to follow them. Sometimes this kind of Sport becomes dangerous, not only by reaſon of the craggy Rocks one muſt climb up to, but becauſe it often happens that the Hunter purſues the *Chamois* into ſome narrow Paſs, where there is but juſt Foot hold for one Perſon, having on one ſide a ſteep Rock above him, and beneath a frightful Precipice; the *Chamois* then having no way to eſcape is obliged to turn upon the Hunter, and endeavours either to jump over him, or elſe ſqueeſe between him and the Rock, in which caſe he puſhes the Man down the Precipice; ſo that all he has to do is either to lay down, or elſe, by ſtruggling, make good his Place, and thruſt the Beaſt down the Rock. It is with their Horns that the little Reed-canes Ladies carry are generally tipt, and of their Skins is made the true Shammy Leather.

The

The Prior of the Place was a good old Man, who ſhewed us many Civilities, and endeavoured alſo to diſſuade us; there were others who repreſented the Thing as mighty eaſy; but we perceived plainly, that they expected, that after we had bargain'd with them to be our Guides, we ſhould ſoon tire, and that they ſhould earn their Money with little Trouble. However our Curioſity got the better of theſe Diſcouragements, and relying on our Strength and Reſolution, we determined to attempt climbing the Mountain. We took with us ſeveral Peaſants, ſome to be our Guides, and others to carry Wine and Proviſions. Theſe People were ſo much perſuaded that we ſhould never be able to go through with our Taſk, that they took with them Candles and Inſtruments to ſtrike Fire, in caſe we ſhould be overcome with Fatigue, and be obliged to ſpend the Night on the Mountain. In order to prevent thoſe among us who were the moſt in wind, from fatiguing the reſt, by puſhing on too faſt, we made the following Rules: That no one ſhould go out of his Rank; That he who led the way ſhould go a ſlow and even Pace; That who ever found himſelf fatigued, or out of Breath, might call for a Halt; And laſtly, that when ever we found a Spring we ſhould drink ſome of our Wine, mixed with Water, and fill up the Bottles, we had emptied, with Water, to ſerve us at other Halts where we ſhould find none. Theſe Precautions were ſo uſeful to us, that, perhaps, had we not obſerved them, the Peaſants would not have been deceived in their Conjectures.

We ſet out about Noon, the 22[d] of *June*, and croſſed the *Arve* over a wooden Bridge. Moſt Maps place the *Glacieres* on the ſame Side with *Chamoigny*, but this is a Miſtake. We were quickly at the Foot of the Mountain, and began to aſcend by a very ſteep Path through a Wood of Firs and Larche Trees. We made many Halts to refreſh ourſelves, and take breath, but we kept on at a good Rate. After we had paſſed the Wood, we came to a kind of Meadow, full of large Stones, and Pieces of Rocks, that were broke off, and fallen down from the Mountain; the Aſcent was ſo ſteep that we were obliged ſometimes to cling to them with our Hands, and make uſe of Sticks, with ſharp Irons at the End, to ſupport ourſelves. Our Road lay ſlant Ways, and we had ſeveral Places to croſs where the * *Avalanches* of Snow were fallen,

* *Avalanche.* To explain the meaning of this Word, I believe it will not be unentertaining to the Reader to cite ſome Paſſages from the *Delices de la Suiſſe*, which contain ſome curious Particulars relating to thoſe mountainous Parts of the World.

and

and had made terrible Havock; there was nothing to be ſeen but

" Beſides theſe Ice Mountains, the " Snows are extremely dangerous to " Travellers. There often fall from theſe " high Mountains immenſe Balls of " Snow, which are called in *German La-* " *winen*, in *Italian Lavine*, in *French* " *Avalanches*, which by the Impetuoſity " of their Fall make a Noiſe like a Clap " of Thunder; ſo that thoſe that are at a " Diſtance imagine it to be really ſo, as " I remember it happened to myſelf " ſome Years ſince, having heard one " that fell in the *Vallais*, though I was " above twenty Leagues diſtant from it. " Sometimes it is cauſed by the new fal- " len Snow, which being driven by the " Violence of the Wind, forms vaſt " Snowballs, which gather by rolling, and " overwhelm every thing they meet, " both Men and Beaſts. As it is very dif- " ficult to avoid them, becauſe they are " extremely ſudden, ſo, being very light, " a Man may remain under them longer " without being ſuffocated; but there " are others which are occaſioned by the " Thaws in the Spring, which are much " more dangerous, great Maſſes of old " Snow, melting underneath, fall off at " once, making a terrible Noiſe, but " ſtill more Ravage, not only deſtroy- " ing Men and Cattle, but even Trees " and Houſes. *Claudian*, who lived in " the fourth and fifth Centuries, informs " us, that ſuch Accidents were known in " his Time, *Vide* 4^to *Conſul. Honorii*:

" multos hauſere profundæ
" Vaſta mole nives; cumque ipſis ſæpe juvencis
" Naufraga candenti merguntur plauſtra barathro,
" Interdum ſubitam, Glacie labente, ruinam
" Mors dedit.

" A Trifle will produce theſe terrible " Accidents in the *Alps*, the Flight of a " Bird, the Leaping of a *Chamois*, the " firing a Piſtol, a Shout, ſpeaking loud, " the Bells of the Mules and Pack- " Horſes, or even a gentle Rain are ſuf- " ficient to looſen this Snow, and bring " it down to the Deſtruction of Paſſen- " gers; ſo little hold has it on theſe ſteep " Places. For this Reaſon they always " take great Care to caution Travellers " in Places where there is danger of this " Sort, to travel early, and in great Si- " lence, and to get through as faſt as " poſſible, as one would out of a Houſe " on Fire: And the *Voiturins* fill with " Hay or Straw the Bells of their Beaſts, " in ſome Places, as in the *Val d'Averſa*; " in the *Griſons* they put the Bells on- " ly a Foot above the Ground, that their " Sound ſhould not extend ſo far as to " cauſe Danger, and in ſeveral Places " they do not uſe them at all for that " Reaſon. In the Lower *Engadine*, be- " tween the Villages of *Lavin* and *Guar-* " *dia*, there are all along the Road ſe- " veral Caves made in the Rocks for " Travellers to retire into when they ſee " any of theſe Mountains of Snow fall- " ing; but if they are ſo unfortunate as " not to be able to reach ſuch a Place, " the only way is to get as cloſe to ſome " Rock as poſſible, and cling to it, ſo " as not to be carried away, and to en- " deavour to keep their Head free, " to be able to breath till Aſſiſtance " comes; for in all theſe Places there " are People paid by the Magiſtrates to " look after the Ways, and keep them " always open; and as ſoon as there is " fallen any Quantity of Snow, they go " and mend the Ways, ſmooth the Snows " with large Pieces of Wood, drawn by " Oxen, and ſhovel it away, and at the " ſame time examine all dangerous Pla- " ces to ſee if there is no poor Traveller " buried under the Snow. The Hiſto- " ries of *Switzerland* are full of the ter- " rible Ravages made in ſeveral Places, " at different times, by theſe *Avalanches*

Trees torn up by the Roots, and large Stones, which ſeemed to lie without any Support; every ſtep we ſet, the Ground gave way, the Snow which was mixed with it made us ſlip, and had it not been for our Staffs, and our Hands, we muſt many times have gone down the Precipice. We had an uninterrupted View quite to the Bottom of the Mountain, and the Steepneſs of the Deſcent,

" in 1499. When the Emperor *Maxi-*
" *milian* made War upon the *Griſons*, a
" Body of 2000 Men of his Troops
" having been ordered to paſs a high
" Mountain to go into the *Engadine*, an
" *Avalanche* falling ſuddenly upon them,
" buried 400 Soldiers, which at firſt
" cauſed great Confuſion and Terror in
" the reſt, which was ſoon turned into
" Laughter, when they ſaw all the 400
" Men ſafe and found out of their ſnowy
" Tomb, not one being loſt: But the
" Year following a Body of *Switzers*,
" going into *Italy* for the Service of the
" *French*, was ſurprized on the Mount of
" St. *Bernard*, by a horrible *Avalanche*
" which deſtroyed a hundred of them.
" And in our Memory, in the Year 1695,
" on the 21st of *February*, at Ten o'Clock
" at Night, a violent Wind brought
" down a moſt terrible *Avalanche* of
" above 100 Yards in width upon a
" Village in the *Vall Madia*, which de-
" ſtroyed eleven Houſes, with as many
" Barns and Stables, ſo entirely, that there
" ſcarce remained one Stone upon an-
" other, and very much damaged nineteen
" other Houſes that remained. The
" Violence of the Wind blew open the
" Windows of ſome Houſes, and filled
" them with Snow; thirty-four Perſons
" periſhed in this Storm, ſome were
" taken alive, almoſt miraculouſly from
" under the Snow, amongſt others a
" Mother and two Children. It happens
" very often that Travellers who are
" caught in the Snows are happily pre-
" ſerved and ſaved from Death. When
" any one is found ſeemingly dead, with-
" out Senſe or Motion, the firſt Reme-
" dy is to plunge him in cold Water.
" To ſome it will appear both barbarous
" and ridiculous to dip a Man, who is
" frozen, and almoſt dead with Cold,
" into cold Water; but let them know
" that it would be certain Death to any
" one to give him heat ſuddenly when he
" is frozen. They begin therefore with
" dipping him into cold Water, upon
" which his whole Body is covered with
" a Cruſt of Ice; afterwards he is put
" into luke-warm Water, then proceed-
" ing by Degrees, they get him into a
" Bed well warmed, and finiſh his Cure
" by Cordials and Fomentations. And
" this Rule holds good alſo with regard to
" Fruits, when the Froſt has caught them;
" one muſt never carry them at once into
" a warm Place, but the way is to dip
" them into cold Water, and then into
" warm Water, by which means they be-
" come pretty good again. I will not
" leave this Subject without obſerving a
" thing, which is truly a phyſical Para-
" dox, which is, that the Water that runs
" from the *Gletſchers*, or Ice Mountains,
" that I have mentioned before, is the
" beſt and wholſomeſt that one can drink.
" A Traveller that paſſes thoſe Mountains
" can drink no other Water if he is heat-
" ed, without Danger of catching a fatal
" Diſtemper; but he may without Dan-
" ger drink this Ice Water, whether faſt-
" ing, or after eating, and it has a kind
" of balſamick Virtue to reſtore and for-
" tify after any Fatigue; this is a known
" Fact, and proved by conſtant Expe-
" rience. The Inhabitants of the *Alps*
" know no other Remedy in Diarrhœa's,
" Dyſenteries, and Fevers, than this Wa-
" ter of the *Gletſchers*, and a celebrated
" Phyſician has recommended it for the
" Tooth-Ach. A Man who paſſes thro'
" theſe Parts ought carefully to avoid two
" Things, *viz.* drinking common Water,
" and ſleeping near a Fountain, or in the
" Snow, ſince they commonly prove
" fatal."

join'd

join'd to the Height where we were, made a View terrible enough to make moſt People's Heads turn. In ſhort, after climbing with great Labour for four Hours and three Quarters, we got to the Top of the Mountain; from whence we had the Pleaſure of beholding Objects of an extraordinary Nature. We were on the Top of a Mountain, which, as well as we could judge, was at leaſt twice as high as Mount *Saleve*, from thence we had a full View of the *Glacieres*. I own to you that I am extremely at a Loſs how to give a right Idea of it; as I know no one thing which I have ever ſeen that has the leaſt Reſemblance to it.

The Deſcription which Travellers give of the Seas of *Greenland* ſeems to come the neareſt to it. You muſt imagine your Lake put in Agitation by a ſtrong Wind, and frozen all at once, perhaps even that would not produce the ſame Appearance.

The *Glacieres* conſiſt of three large Valleys, that form a kind of Y, the Tail reaches into the *Val d'Aoſte*, and the two Horns into the Valley of *Chamoigny*, the Place where we aſcended was between them, from whence we ſaw plainly the Valley, which forms one of theſe Horns.

I had unluckily left at *Chamoigny* a pocket Compaſs, which I had carried with me, ſo that I could not well tell the Bearings as to its Situation; but I believe it to be pretty nearly from North to South. Theſe Valleys, although at the Top of a high Mountain, are ſurrounded with other Mountains; the Tops of which being naked and craggy Rocks, ſhoot up immenſely high; ſomething reſembling old *Gothic* Buildings or Ruines, nothing grows upon them, they are all the Year round covered with Snow; and our Guides aſſured us, that neither the *Chamois*, nor any Birds, ever went ſo high as the Top of them.

Thoſe who ſearch after Cryſtal, go in the Month of *Auguſt* to the Foot of theſe Rocks, and ſtrike againſt them with Pick-axes; if they hear them reſound as if they were hollow, they work there, and opening the Rock, they find Caverns full of Cryſtaliſations. We ſhould have been very glad to have gone there, but the Seaſon was not enough advanced, the Snow not being yet ſufficiently melted. As far as our Eye-ſight could reach, we ſaw nothing but this Valley; the Height of the Rocks, which ſurrounded it, made it impoſſible for the Eye to judge exactly how wide it was; but I imagine it muſt be near three Quarters of a League. Our Curioſity did not ſtop here, we were reſolved to go down upon the Ice; we had about four hundred Yards to go down, the Deſcent was exceſſively ſteep, and all of a dry crumbling Earth, mixt with Gravel,

vel, and little looſe Stones, which afforded us no firm footing; ſo that we went down partly falling, and partly ſliding on our Hands and Knees. At length we got upon the Ice, where our Difficulty ceaſed, for that was extremely rough, and afforded us good footing; we found in it an infinite Number of * Cracks, ſome we could ſtep over, others were ſeveral Feet wide. Theſe Cracks were ſo

* "In ſome Places there are found Mountains of Ice, which not only never melt, but always increaſe by the falling of freſh Snow, ſo that by little and little they extend themſelves, and cover the Country all about them. The *Germans* call them *Gletſcher*, we call them commonly *Glacieres*. Theſe Ice Mountains are moſtly of an immenſe Height, and ſometimes they ſplit from Top to Bottom, which they do with ſo horrible a Noiſe, that one would think the whole Mountain was breaking in Pieces; theſe Clefts differ as to the Width and Depth; there are ſome two, three, or four Feet wide, and three or four hundred Yards deep, and if a Man falls in he is almoſt inevitably loſt, being either killed by the Cold, or drowned in the melted Snow: However, in many Places, one is obliged to paſs over theſe Mountains, there being no other Way, and when there is any Snow new fallen it is very dangerous, for the Ice covers theſe terrible Clefts, ſo that the Travellers are taken as Birds in a Snare, and fall in and periſh. To avoid theſe Misfortunes Travellers take Guides, who with long Poles ſound the way to ſee there is no Cleft, and when they find one they muſt jump over, or elſe they paſs over a Board, which they carry for that Purpoſe. The Difficulty augments when there is Snow new fallen, for then one ſees no track of the way at all, and one muſt obſerve certain Poles ſet up to ſhew the way, which the *Griſons* call *Stazas*; but in many Places the Inhabitants ſet up none, that the Travellers may be obliged to pay them well for being their Guides. On theſe Occaſions it is neceſſary to have Iron Cramps to ones Shoes, not to ſlip, and withal take great Care where one ſets one's Feet; and on this Occaſion I hope the Reader will not blame me for inſerting a wonderful Adventure which happened ſome Years ago to a Hunter of *Glaris*, named *Gaſper Stoëri*. This Man being in purſuit of *Chamois*, with two other Hunters on Mount *Limmeren*, and thinking he was walking on the Snow very ſafely, fell into a deep Cleft of the Ice: His Companions, who loſt ſight of of him, were in great Uneaſineſs, and expected no otherwiſe than that he muſt be killed, either by the Fall, or by the Cold of the Ice. Nevertheleſs that they might not reproach themſelves with letting him periſh, without endeavouring to help him, they ran to the neareſt Cottage, which was full a League off, to look for a Rope, or ſomething elſe to aſſiſt him; but finding nothing there but an old Blanket, they cut it into long Slips, and went to the Hole where their Companion was. While they were going and coming, poor *Stoeri* was almoſt dead with Cold, being up to his Middle in ic'd Water. The Depth of which was ſo great under him, that he could not ſee to the Bottom, and by extending his Arms and Legs, he held himſelf faſt againſt the Sides of the Cleft of Ice, ſo that he was ſhut up there, as it were, in a cloſe, cold, and deep Dungeon. You may imagine in what a Situation he was, he expected nothing but Death, and was recommending his Soul to God, when his Companions arrived, who let down the Slips they had cut, to pull him out; he had Strength enough to tie them about his Body, and by this Means was drawn up to the Top of the Pit; but as he was juſt upon the Point of being delivered, unhappily the Slip which held him up broke, and he fell again into the iced Water, and was in greater Danger than before. He carried down with him a Piece of the Slip which broke, and the Remainder was not long enough

deep, that we could not even ſee to the Bottom; thoſe who go in ſearch of Cryſtal are often loſt in them, but their Bodies are generally found again after ſome Days, perfectly well preſerved. All our Guides aſſured us, that theſe Cracks change continually, and that the whole *Glaciere* has a kind of Motion. In going up the Mountain we often heard ſomething like a Clap of Thunder, which, as we were informed by our Guides, was cauſed by freſh Cracks then making; but as there were none made while we were upon the Ice, we could not determine whether it was that, or *Avalanches* of Snows, or perhaps Rocks falling; though ſince Travellers obſerve, that in *Greenland* the Ice cracks with a Noiſe that reſembles Thunder, it might very well be what our Guides told us. As in all Countries of Ignorance People are extremely ſuperſtitious, they told us many ſtrange Stories of Witches, *&c.* who came to play their Pranks upon the *Glacieres*, and dance to the Sound of Inſtruments. We ſhould have been ſurpriſed if we had not been entertained in theſe Parts, with ſome ſuch idle Legends. The *Bouquetins* go in Herds often to the Number of fifteen or ſixteen upon the Ice, we ſaw none of them; there were ſome *Chamois* which we ſhot at, but at too great a Diſtance to do any Execution.

There is Water continually iſſuing out of the *Glacieres*, which the People look on as ſo very wholeſome, that they ſay it may be drank of in any Quantities without Danger, even when one is hot with Exerciſe.

The Sun ſhone very hot, and the Reverberation of the Ice, and circumjacent Rocks, cauſed a great deal of thaw'd Water to lie in all the Cavities of the Ice; but I fancy it freezes there conſtantly as ſoon as Night comes on.

Our Guides aſſured us, that, in the time of their Fathers, the *Glaciere* was but ſmall, and that there was even a Paſſage thro' theſe Valleys, by which they could go into the *Val d'Aoſte* in ſix Hours: But that the *Glaciere* was ſo much increaſed, that the Paſſage was then quite ſtopped up, and that it went on increaſing every Year.

to reach him, and, as an additional Misfortune, in this ſecond Fall he broke his Arm. However his Companions did not loſe Courage, they divided the Slip again, and joining the Pieces end to end, lower'd them down to him; he with great Difficulty, with his broken Arm, tied it round his Body, while with the other he held to the Sides of his Dungeon, and with this weak Inſtrument, by a Miracle of Providence, was drawn out of this terrible Pit, and though he had at firſt fainted away, God gave him Strength to come to himſelf, and to bear the Fatigue of being carried to a Houſe where he entirely recovered." *Vid. Delices de la Suiſſe, Tom.* 1. *pag.* 22. *& ſeq.*

We

We found on the Edge of the *Glaciere* ſeveral Pieces of Ice, which we took at firſt for Rocks, being as big as a Houſe; theſe were pieces quite ſeparate from the *Glaciere*. It is difficult to conceive how they came to be formed there.

Having remained about half an Hour upon the *Glaciere*, and having drank there in Ceremony Admiral *Vernon*'s Health, and Succeſs to the *Britiſh* Arms, we climb'd to the Summit, from whence we came, with incredible Difficulty, the Earth giving way at every ſtep we ſet. From thence, after having reſted ourſelves a few Minutes, we began to deſcend, and arrived at *Chamouny* juſt about Sun-ſet, to the great Aſtoniſhment of all the People of the Place, and even of our Guides, who owned to us they thought we ſhould not have gone through with our Undertaking.

Our Curioſity being fully ſatisfied, we left *Chamouny* the next Day, and lying at *Salanches*, we got the 23d to *Bonneville*. The Nearneſs of this Place to the *Maule* raiſed in us an Inclination to go up it. We ſet about this Taſk the next Day early in the Morning; we fancied that after the *Glacieres* every Mountain would be eaſy to us, however it took us more than five Hours hard labour in getting up; the Aſcent being extremely ſteep; though, after two thirds of the Way, there is a fine green Turf quite up to the Top, which ends in a Point, the Mountain being like a Sugar-Loaf on one Side, and quite perpendicular on that Part which lies fartheſt from *Geneva*. From this Point there is a moſt delightful View, on one Side, upon the Lake, *Geneva*, and the adjacent Parts; on the other, upon high Mountains cover'd with Snow, which riſe around, in form of an Amphitheatre, and make a moſt Pictureſque Proſpect. After having ſtay'd ſome time here, we returned back, and went on to *Annecy*, where we lay, from whence the next Day we got to *Geneva*.

Thoſe who are deſirous to undertake this Journey, ought not to ſet out till towards the Middle of *Auguſt*; they would at that time find not ſo much Snow on the Mountain. They might go to the Cryſtal Mines, and divert themſelves with ſhooting of *Bouquetins*; the Oats would then be cut, and their Horſes would not ſuffer ſo much. Although we met with nothing which had the Appearance of Danger, nevertheleſs I would recommend going well armed; 'tis an eaſy Precaution, and on certain Occaſions very uſeful, one is never the worſe for it, and oftentimes it helps a Man out of a Scrape. Barometers to meaſure the Height of the Mountains, portable Thermometers, and a Quadrant to take Heights

with, would be uſeful, if there were a Mathematician in Company. A Tent would not be neceſſary, unleſs for thoſe who had a Mind to examine every thing with the greateſt Exactneſs, and make Obſervations; in this Caſe one might pitch it upon the Mountain, and paſs the Night in it, if it were neceſſary, for it did not ſeem very cold there.

With theſe Precautions one might go through the other Parts of theſe Valleys, which form the Y, and one might find out whether the Cracks change daily as we were told; one might alſo Meaſure thoſe exceſſive high Rocks which are on the Side of the *Glaciere*, and make many other curious Obſervations, according to the Taſte and Genius of the Travellers; who, if they were inclined to Botany, might find an ample Field of Amuſement.

One who underſtood Drawing might find wherewithal to imploy himſelf, either on the Road, or in the Place itſelf; in ſhort, a Man of Genius might do many things which we have not done. All the Merit we can pretend to is having opened the way to others who may have Curioſity of the ſame Kind.

It would be right to take Victuals ready dreſs'd, and Salt Meat, Bread and Wine, for there are ſome Places where one can get no Proviſions, and the little there is to be had in other Places, is very bad. We bought a Sheep, which we killed, and dreſſed upon the Spot.

It is neceſſary to carry Halters to tie the Horſes, cut Shoes, Nails, Hammer, *&c.* for they loſe their Shoes continually in thoſe ſtoney Roads.

With ſuch Precautions all kinds of Journeys become eaſy and agreeable, even in the moſt deſart Countries, and one is then more in a Condition to obſerve with Care and Accuracy, whatever occurs worth Notice.

This is the Subſtance, Sir, of what I can recollect of our Journey. My having ſo long defer'd giving you this Account is owing to the Incapacity I found in myſelf to ſay any thing worth being preſented to a Perſon of ſo good a Taſte as yourſelf. However, upon the whole, 'tis your good Taſte which ought to encourage me: Your lively and penetrating Imagination, which unites in one, both the Poet and Painter, will at once lay hold and perfect what I have but ſlightly ſketched. I am, with the greateſt Eſteem,

SIR,

Your moſt Obedient Humble Servant.

An ACCOUNT *of a Journey to the* Glacieres *in* Savoy, *in a* LETTER *addreſſed to the* Engliſh *Gentleman, Author of the foregoing Letter, by* P. Martel, *Engineer. Tranſlated from the* French.

SIR,

SINCE your Departure for *England* I have had an Opportunity of going to the *Glacieres* of *Chamouny* along with four Friends, whoſe Curioſity had been raiſed by reading your Letter, which has been liked by all People of Taſte, and reſolved to endeavour to make thoſe Obſervations which you was deſirous to have made laſt Year. I therefore took with me every thing that appeared neceſſary for that Purpoſe, and made uſe of all poſſible Precautions to ſucceed, in the Manner you will ſee.

I do not preſent this Account to you, Sir, as a Work fit to be compared with yours, but rather as a Memorial, which will ſerve to ſupply your Journal with what you would have choſen to have put there, and which you certainly would have inſerted yourſelf had you had Inſtruments with you.

You will firſt of all ſee what Inſtruments I provided, and what Precautions I took; you will ſee alſo a Journal of my Obſervations, to which I ſhall add an exact Account of what we ſaw. I ſhall endeavour to explain the Phyſical Cauſe which ſupplies the *Glacieres*. I ſhall put at the End of this Relation a View of the Valley of *Chamouny* [a], taken from the Church; a View of the Valley of *Ice*, taken from *Montanver* [b]; a Map of the Road from *Geneva* [c] to the Source of the *Arve*, rectified from Obſervations made upon the Places; and ſome Deſigns of *Chamois* and *Bouquetins* [d], which you may perhaps like to ſhew to your Friends in *England*. I ſhall join the Obſervations of one of my Friends, and Fellow Travellers, upon the Plants which we found both upon the Mountain, and in the neighbouring Places. Laſtly, I ſhall compare our Obſervations and Menſurations, with thoſe of the celebrated Mr. *Fatio de Duillier*, which are inſerted in the Appendix to the Hiſtory of *Geneva*. Be aſſured, Sir, that this Relation is very exact, all

[a] Plate 3. [b] Plate 1. [c] Plate 2. [d] Plate 4.

all the Operations have been repeated, and calculated twice with great Care, ſo that you may rely on the Exactneſs of every thing contained in this Account. Before I come to the Point, it may be proper to tell you who were the People that compoſed our Company. There was a Goldſmith very well ſkilled in Minerals; an Apothecary who was a good Chemiſt and Botaniſt; Monſieur *Martin* and Mr. *Girod*, whom you know to be very curious; which made us a Company pretty well qualified for this Undertaking, eſpecially as each of them, according to his particular Turn, contributed to diſcover ſomething, and beſides that were very ſerviceable to me in making my Obſervations.

I took with me a good Barometer, included in a wooden Tube, which I filled at every Station, according to the Method of *Torricelli*, with all poſſible Precaution; and for this Purpoſe, carried a good deal of Mercury to be always provided in Caſe of Accidents: I had with me my Semicircle of ten *Engliſh* Inches Radius, with ſome Sea Compaſſes, a Camera-Obſcura, and all Implements for Drawing. I took alſo a Thermometer of my own make, filled with Mercury, divided into a hundred equal Parts, from the freezing Point, to boiling Water, anſwering to 180 Parts of *Farenheit*'s Thermometer, beginning at 32, and ending at 212. I divided my Barometer into Inches and Lines, *French* Meaſure, to have at once the Height of the Mercury. I left at *Geneva* with Baron *Rotberg* a Barometer and Thermometer, ſimilar to thoſe I took along with me; that I might compare our Experiments, with the Variations of the Barometer, in caſe the Weather had varied; but the Weather being all the Time fine, the changes were not ſenſible; your Journal ſerved us as a Guide, both for our Rout, and for ſeveral Precautions you mention as neceſſary.

I muſt obſerve to you that before our Departure, I waited on Profeſſor *Calandrini*, to get ſome farther Inſtructions, concerning the Proportion of the Height of the Mercury, at different Diſtances from the Center of the Earth; he communicated to me a Canon to make a Table by, for that Purpoſe; but I preferred the fundamental Experiment, and the Tables of Mr. *Scheutzer*, for Reaſons which may be ſeen in the Philoſophical Tranſactions N° 405. You will find here all the Heights of the Mountains exactly calculated by thoſe Tables, according to the Height the Barometer ſtood at, and I found them agree more exactly than any other with my Trigometrical Operations.

We left *Geneva Aug.* 20. 1742. Before we ſet out I tried my Barometer

Barometer, which upon the Side of the *Rhone* ſtood at 27 Inches $\frac{1}{12}$ *; and the Thermometer at 18 D. above the freezing Point which anſwers to 60. of *Farenheit*. We dined at *Bonneville*; where the Barometer was at 26 $\frac{8}{12}$; which make 6 Lines leſs than at the Side of the *Rhone* at *Geneva*; thus it appears that the *Arve* is at *Bonneville*, above the Level of the *Rhone* 403 *F.* 10 *I.* 5 *L. French* Meaſure; which is not a very great Riſe, conſidering the Diſtance is 5 Leagues, or 15 Miles *Engliſh*.

We left *Bonneville* at half an Hour after two, and reached *Cluſe* about ſix, and got to *Salanches* that Night. We made ſeveral Trials of the Echoes, which you mention in the Valley between theſe two Places, and found they continued full four Minutes. The great Drought had intirely ſtopped the fine Caſcade you mention, at the *Nan Darpena*. At *Salanches* I tried my Barometer, which was at 26 $\frac{4}{12}$, which was ten Lines leſs than at *Geneva*, and gave us in Height 670 *F.* 10 *I.* 0 *L.* above the *Rhone*. The Thermometer was not changed at all. Going from *Salanches* to *Servoz* we went through *Paſſi*, a Village ſituated almoſt at the Foot of a Mountain of the ſame Name. This Pariſh contains ſeveral Hamlets, which extend near three Leagues; *Paſſi* is on the right Side of the *Arve* going down the Stream, and on the other Side is ſituated the Village of *St. Gervais*, near four Miles beyond the laſt Hamlet of *Paſſi*. Leaving *St. Gervais* we began to climb the Mountain, and paſſed over a little Bridge, under which runs a Water called *la Gouille*, which falls from the Mountain, and carries with it a very black Sand; nevertheleſs near the Bridge there is a little Pond at the Bottom of a Hill, where this Water is vaſtly clear and beautiful. Not far from thence there is a Water which is called the *Nan des bois*: This too carries along with it a black Sand, which the Inhabitants ſay is blacker the more abundant the Water is: From thence we arrived at *Servoz*, on the right Side of the *Arve* in a very narrow Valley, from whence we began to diſcover the high Mountains which ſurround the *Glacieres*, the Barometer ſtood at *I.* 25 $\frac{7}{12}$, which is *I.* 1 $\frac{7}{12}$ lower than at the *Rhone*, and gave for Height *F.* 1306. 0. 7. and from *Salanches*, the Difference of *I.* $\frac{9}{12}$ which is *F.* 636. 0. 1. in five Leagues; this being the greateſt Declivity that the *Arve* has from its firſt Source: For

* All the Meaſures mentioned here are *French* Meaſure, the Foot being to our Foot as 114 to 107.

here it rolls from Mountain to Mountain 'till it comes to the Plain of *Paſſi*. At *Servoz* they ſhew'd us Lead-Ore, which to me ſeem'd to be of little Value; they aſſured us that this Valley of *Servoz* was formerly a Lake. There is ſtill remaining an old Tower, at a ſmall Diſtance from the *Arve*, which they call the *Tower of the Lake*. They add moreover, that on the Side of this Lake, there was a Town called the City of *St. Peter*, which was ſwallowed up, and that the Lake having broke thro' its Banks, run all out into the *Arve*, and there remains only now a marſhy Valley.

From *Servoz* we took the Rout of *Chamouny*; we had the *Arve* on our right Hand, but ſoon paſſed it over a very bad Bridge, called *Pont Peliſſier*; from whence we came to that ſteep Mountain, which they call *les Montées*, or the Stairs, where one of our Horſes loſt a Shoe and almoſt all his Hoof; from thence we entered into the Valley of *Chamouny*, having on our left the *Arve*, and on our Right a fine Hill, which reaches as far Southward as the Mountain called *Mont blanc*. Here we found ſeveral Signs of Iron Ore, at leaſt they no ways differed from thoſe by which they find out Iron Mines in *Burgundy*. A League farther we came to the Village of *Fouilly*, which is only a Hamlet of *Chamouny*, and from thence we arrived at *Moncoir*, where there is a Church belonging to *Chamouny*; and from thence paſſing the *Arve*, over a Bridge, we arrived at *Chamouny* in the Evening. Here I tried the Barometer, which at the Side of the *Arve* ſtood at 25 *F.* $\frac{4}{12}$, which is 1 *I.* $\frac{10}{12}$ lower than at *Geneva*; from whence I concluded that the *Arve* at this Place was above the Level of the Lake 1520 *F.* 5. 5. The Night between the 22^{d} and 23^{d} I hung out my Thermometer in the open Air, and found it in the Morning two Degrees above the freezing Point, which anſwers to 35 $\frac{1}{2}$ Degrees of *Farenheit*. This made us cloath ourſelves warmer, in order to go up the Mountain; for which Place we ſet out about ſix in the Morning, having with us ſeven Men both to aſſiſt us in climbing, and to carry Proviſions; we took in other Reſpects the ſame Precautions as you did, and I carried my Inſtruments with me. At a Halt which we made after three Hours climbing, I tried my Barometer, which gave me 1 *I.* $\frac{4}{12}$ lower than at *Chamouny*; and by the Table, I found that we had mounted 1179 *F.* 0. 1. from the *Arve* at *Chamouny*; after two Hours and half more very difficult climbing, we got on the Top of the Mountain called *Montanver*; from whence we ſaw the Ice Valley, and were ſtruck with Aſtoniſhment

at

at ſo extraordinary a Sight. After having taken a View of it while we reſted, I tried the Barometer, which ſtood at 22 $\frac{8}{12}$ which was 2 $\frac{8}{12}$ leſs than at *Chamouny*, which gives for the Height of the Mountain 2427 *F.* 8. 10. and above the Level of the Lake *F.* 3947. 2. 3.

In order to find a Place to Dine in we deſcended towards the Ice, and got behind a kind of Mound, of great Stones which the Ice had raiſed, as I will explain hereafter. The Barometer roſe two Lines, which ſhewed us we had gone down *F.* 159. 7. 8. in this Place we dreſſed our Victuals, and dined under the Shade of a great Rock. The Thermometer was got down to only one Degree above the freezing Point, which anſwers to about 33 $\frac{1}{2}$ of *Farenheit*. We were not able to ſtay here long by reaſon of the Cold, which obliged us to get into the Sunſhine, altho' we were dreſſed as in the Middle of Winter; and after Dinner every one went according to his Inclinations, ſome upon the Ice, others to look for Cryſtal; for my Part I took two Men with me, and returned to *Montanvert*, where I remained near three Hours, which time I employed in making a Plan of the *Glacieres*, which I have put at the End of this Account. I was aſſiſted in this Operation by my Guide, who was a very intelligent Perſon, not only knowing the Country, but having alſo aſſiſted in the laſt Survey, which the King of *Sardinia* had cauſed to be made of *Savoy*. I have more reaſon to believe this Map to be exact, becauſe I have compared it with a Map that I ſaw at the *Greffier's* of *Chamouny*, which was of great Service to me. The Nearneſs and Height of the Mountains rendered it impoſſible to make uſe of my *Camera Obſcura*, to take a Proſpect of the *Glacieres*, ſo that leaving *Montanvert*, I arrived at the Priory of *Chamouny* at Seven in the Evening.

My Companions were next Morning in ſo great a hurry to go away, that I had not time to draw any Views as I intended; all I could do was to take with my Semicircle the Height of the *Mont Blanc*, by two different Operations which correſponded exactly. I did the ſame for the *Montanvert*, where we had been the Day before, and juſt ſketched out the View of *Chamouny*, here annexed, taken from above the Church, from whence I could ſee the Mountain where the *Arve* takes its Source, the chief Outlets of the *Glaciere*; the higheſt Mountains; and the Villages, as you will ſee in *Plate* 3.

I ſhall here interrupt my Narration, to give you a more diſtinct Idea of the Valley of *Chamouny*, the *Glacieres*, and whatever ſeemed to me to be moſt remarkable, during the ſhort time which I remained there. Firſt of all then, The Valley of *Chamouny* may be conſidered as reaching from the Top of the Mountain called the *Montées*, as far as the Mountain, from from whence the *Arve* takes its Source, which is called the *Col de Balme*, which bounds it to the N. E. The Maps give this Valley the Form of a Creſcent, but if it were ſo it ought to be narrow at the Ends, and wide in the Middle; but it is on the contrary rather narroweſt in the Middle; however it muſt be owned that it bends conſiderably. At the Entrance into it from *Servoz* it runs from Weſt to Eaſt, and afterwards to N. E. ſo that it forms an Elbow about the Middle.

The Length of this Valley is about eighteen *Engliſh* Miles; as for its width, at leaſt in the Middle, it cannot be above 400 Geometrical Paces, or about half an *Engliſh* Mile. It contains ſeveral Hamlets, the four principal ones are, *Fouilly*, juſt as you come into it; *Montcoir*, where there is a Church on the Left of the *Arve*; the Priory, which is in the Middle, properly called *Chamouny*, and is on the right Side of the River; and *Argentiere* near the End of the Valley. This Valley is bounded on the N. E. by the *Col de Balme*, where the *Arve* riſes from two Springs, at a very little Diſtance from one another; having the *Glacieres* to the S. E. all along the Valley, which reach as far as above St. *Gervais*, in the Valley of *Salenches*, where there is a *Glaciere*, called *Glaciere de St. Gervais*, which comes from *Mont Blanc*, bending a little towards the South, and not following the Curve of the Valley.

The N. W. Side is bounded by the Mountains of *Valorſine*, and the S. W. by the Paſſage which goes to *Servoz*. The *Arve* runs quite through the Middle of the Valley, receiving in its Paſſage the *Arbairon*, and many other Rivulets and Torrents, which only have Water when the Snows melt. To have a diſtinct Idea of the *Glacieres* you muſt ſuppoſe a great Valley, nearly parallel to that of *Chamouny*, but much higher, it being ſituated on the Top of high Mountains. This Valley may be about twelve Miles long, and about two broad; a great Part of it may be ſeen from *Montanvert*, which is the Mountain we went up. From thence you ſee many Points of Mountains,

ſhooting

ſhooting up to a prodigious Height, altho' the Place on which we were is near *F.* 2427. 8. *Paris* Meaſure high above the Valley, the Barometer being lower by 2 $\frac{8}{12}$ Lines at the Top of it than at the Bottom, and having calculated the Height of this Mountain, by a trigonometrical Operation, upon a Baſe of 1440 Feet, I found nine Feet more, and this by two different Operations. Having from the ſame Baſe meaſured the Height of the higheſt Point of the *Mont Blanc*, I found by two Operations 10939, taking in the Height of the Mountain where we were, and from the *Rhone* 12459 Feet. Moſt of theſe Points are all covered with Ice, from the Top quite to their Bottoms, which join the *Glacieres* of each Side.

I can think of nothing more proper to give an Idea of this Valley, than the Compariſon you have made uſe of, namely, a great Lake, which being violently agitated by a ſtrong Wind, ſhould have been frozen all at once. For all the *Glaciere* when ſeen from *Montanvert* has at firſt that Appearance; but as ſoon as you come near it, you perceive that ſome of the Inequality or Waves are more than forty Feet high.

This great Valley has many Outlets between the Mountains; five of which, being the principal ones, come into the Valley of *Chamouny*, and theſe Extremities, or Outlets, are what the Inhabitants of *Chamouny* call *Glaciers*. Theſe Outlets are very ſteep, ſome more ſo than others. Now to judge of the Cauſe, which occaſions a perpetual Ice in this Valley, we muſt conſider its Situation in two Reſpects; *Firſt*, As to the Sun; and *Secondly*, As to the Atmoſphere. We muſt conſider its greateſt Length, as lying from the Sunriſing in the Summer Solſtice, to the Sunſetting in the Equinox, by reaſon of its Curvity, being of all Sides ſurrounded with very high Mountains, and that chiefly on the South Side, where there is the Mountain *des Eſchaux*, which is very high. The North Side of this Mountain is always covered with Ice, while the Mountain, which is oppoſite to it on the other Side of the *Glaciere*, has no Ice at all on it. As to the Atmoſphere, you muſt remember that the Surface of the Ice is raiſed above the Valley of *Chamouny* 2262 Feet. This great Height cauſes the Air to be always very cold in this Valley of Ice, of which I will add ſome inconteſtable Proofs. We were there in the Month of *Auguſt*, in very fine dry Weather, without any Appearance of Rain, nor was there

any

any Wind ſtirring all that Day we were upon the Mountain, but always a clear Sun ſhine; nevertheleſs my Thermometer deſcended to two Degrees above the freezing Point, which anſwers nearly to 35 $\frac{1}{7}$ of *Farenheit*; and this in the Valley of *Chamouny*, where the Air is not near ſo piercing as it muſt neceſſarily be on the Ice Valley, where the Thermometer ſunk one whole Degree, under the Rock where we dined, beſides when we ſet out from *Chamouny* in the Morning, we paſſed dryſhod over the Beds of many little Streams, which deſcend in the Day-time from the Mountains, and which ran abundantly at our Return in the Evening; ſo that we were forced to go over the Foot Bridges. *Thirdly*, We ſaw upon the Valley of Ice a vaſt Number of little Reſervoirs, containing a very fine Water, which immediately congeals after Sunſet; and that in the greateſt Heats, as all the Inhabitants of the Country aſſured me unanimouſly, not having remained late enough on the Mountain to have ſeen it myſelf. But this Obſervation is confirmed by the little Rivulets above mentioned, which ceaſe running in the Night. If one conſiders the Height of theſe Mountains, which I have already mentioned, whoſe Tops loſe themſelves in the Clouds; if one conſiders the vaſt Quantities of Water, which muſt come from them by the melting of the Snow, that covers them upon the leaſt Rains that happen in the Plain, and that this Water and Snow turn into Ice immediately at Sunſet; it is eaſy to diſcover the Cauſe which fills theſe Valleys with Ice. Theſe Reaſons, in my Opinion, are ſufficient, without having recourſe to the Effects of Nitre; nor indeed have we found any Appearance of it in the Taſte of the Ice: And I may add, that, having put ſome of this Water into a Silver Spoon, and made it evaporate by Fire, it left neither Sediment, or any Films, nor any other Marks of Nitre: So that I am firmly perſuaded, that Nitre has no Share in the Production, or the Conſervation of this Ice. For Ice, produced by an artificial Congelation, has an acrimonious Taſte; whereas this produces a ſweet Water, equal to that of our beſt Springs. The *Glacieres* in the Ice Valley are not always in the ſame State, they ſometimes augment, and ſometimes diminiſh; it is probable they have been more abundant; by the Marks which remain they muſt have been 80 Feet higher than they are now. One ſees on both Sides of the *Glacieres*, and in the Outlets, a white Stone, mixed with a white Sand, very like the Rubbiſh of old

old Buildings. The Stone appears calcin'd, and breaks like Lime that has been expoſed ſome time to the Air; the Edges of the *Glacieres* are very ſteep, probably becauſe the Ice riſes againſt the Bank. The Place where we dined was a kind of large Parapet of Stone-work, the Stones of which were very large, and heaped one a Top of the other like a Wall, being very ſteep towards the Ice, with very little or no ſlope. This kind of Wall was about 80 Feet high, and 20 thick; behind it was a kind of a Terras which joined the Mountain, from whence we could not ſee the Ice without getting on the Parapet. It is to be obſerved, that the *Glaciere* is not level, and all the Ice has a Motion from the higher Parts towards the lower; that is to ſay, that it ſlides continually towards the Outlets into the Valley, which has been remarked by many Circumſtances. *Firſt*, By great Stones, which have been carried quite into the Valley of *Chamouny*; they ſhewed us one of a very large Size, which ſeveral old People aſſured us, that they had ſeen upon the Ice. I have already ſaid, that the Waves, for ſo I call the Inequalities of the Ice, were ſome of them 40 Feet high. I will now add, that the Hollows between them run all tranſverſly to the Courſe of the Ice; ſo that in the Valley they lay one way, and in the Outlets another, always croſſing the Direction of the Ice: The Cavities between the ſmall Waves are all full of a very clear Water; there are on the Ice an infinite Number of Clefts, of different Widths, ſome twenty Feet long, and four or five wide, others leſs. Theſe are almoſt all in the weak Parts of the Ice, *i. e.* in the Hollows of the Waves, and all directed like the Waves in a tranſverſe, or oblique Manner. 'Tis by theſe Clefts we could judge of the Thickneſs of the Ice; in the Hollows it is only 5 or 6 Feet thick, in the high Waves 40 or 50. The Reflection of the Light in theſe Clefts produces the Effect of a Priſm; and 'tis very beautiful, even from the Mountain, to ſee the Mixtures of blue and green ariſing from theſe Clefts, and the Reſervoirs of Water, eſpecially when the Sun ſhines on this vaſt Valley of Ice. By theſe ſame Clefts you ſee under the Ice, Waters which run from it, at leaſt in the Day-time, which ſometimes muſt touch the inferior Surface of the Ice, as they did then, of which I ſhall give two Proofs, which appear inconteſtable. *Firſt*, Our Guides puſh'd a Pole a great way in, and having let it go, it roſe again of itſelf, which could be occaſioned by nothing but the Water.

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The other Proof is, that when any have had the Misfortune to fall into theſe Clefts, which has happened to ſome Searchers of Cryſtal, they have been found again upon the Ice, perfectly preſerved after a few Days, as ſoon as there has been a little Rain, or mild Weather. The Cauſe of this can only be the Increaſe of the Water, which, not finding a ſufficient Paſſage under the Ice, riſes by theſe Clefts, and ſo gets rid of every thing that is lighter than itſelf: But becauſe the Paſſage for ſo large a Quantity of Water is not ſufficient, though the Number of Clefts be very great, it is very probable, that it often raiſes the whole Maſs of Ice. One might draw from this many Conjectures, both for diſcovering the Cauſe of the Increaſe of the *Glacieres*, during the Time of the greateſt Heats, and alſo to explain the Elevation of the Stones on the Edges.

I have already ſaid, that the Thickneſs of the Ice is very conſiderable, and I will now ſay ſomething upon its Conſiſtence. We found it generally much lighter, and much thinner towards the Edges of the Valley, than in the Middle: For although both the one and the other ſwim upon the Water, yet that in the Middle ſinks the deepeſt. I obſerved before that the Mountains or Points, which we ſaw from the Mountain which we went up, are very high, and that there are many of them. I particularly mentioned three of the principal of them, namely, one towards the South, and two towards the Weſt; that which is towards the South, and which we firſt diſcovered before us, is called *L'Eguille du Dru*; this Point looks very like an Obeliſk, the Top of which is loſt in the Clouds, making a very acute Angle at the Summit, and not much unlike a great *Gothic* Tower, built of white and brown Stone, the Parts of which are very rough. For we muſt obſerve, that the Pieces which fall off break in a perpendicular Direction, leaving here and there little Parts by themſelves, which make the Mountain look as if it was compoſed of an infinite Number of little Towers. The Effect of this is very beautiful when the Sun ſhines on them, by reaſon of the agreeable Mixture of *Clair Obſcur*, which is prodigiouſly varied: This Mountain is too ſteep to have any Ice upon it, or indeed much Snow. The two other Points on the Weſt Side are *L'Eguille de Montmallet*, which is covered always wieh Ice, and is the neareſt the *L'Eguille du Dru*; and *Mont Blanc*, which is the fartheſt to the Weſt. 'Tis this Point of *Mont Blanc*, which is ſuppoſed to be the Heigheſt in all the *Glacieres*, and perhaps of all the *Alps*. Many Perſons of the Country

Country who have travelled assured me, that they had seen it from *Dijon*, and others from *Langres*, which is 135 Miles distance. For the Top of it is easy to be distinguished, because it is blunt, and quite steep on the North-side; if the Sides were prolonged, so as to make an Angle at the Top, I imagine it would be of 25 or 30 Degrees. This Mountain is entirely covered with Ice, quite from the Top down to the Bottom. The Mountain which we went up in order to see the Valley of Ice has three Names, the East-side is called *Montanvert*, and that towards the West *Blaitiere*, and that in the Middle the *Charmaux*. Upon this Mountain there rise four Points something like the *L'Eguille du Dru*, which are called the Points of *Charmaux*. All these Points are absolutely inaccessible, some by reason of the Ice, which covers their Surface almost entirely, as *Montmallet* and *Mont Blanc*, and others on account of their Steepness. 'Tis at the Foot of these Mountains, and along the Valley of the *Glacieres*, that they find Crystal, and not under the Ice, as some have pretended. The Crystal is found in the very Substance of the Rock, after this Manner: Those who go in search of it know where to find it by certain white and blue Veins, which they see upon the Rock. These Veins are either alone, or many of them together, which unite in one Point; they strike upon the Extremity of the Veins, and when they hear a hollow Sound they break the Rock, and find the Crystal in Cavities, which are sometimes many Feet deep, which they call Ovens. Crystal is a Stone which, in my Opinion, is produced by a gentle Vegetation, and not by Congelation; every one knows that they are Shoots, all of the Figure of a Hexagon, joined one to another, almost like the Cells in Honey Combs. These Shoots are sometimes unequal in Thickness and Length, but all terminate in a Point, as if they had been cut Diamond Fashion, they all stick to a kind of Stone of an irregular Shape, which is a kind of Root to them, partaking of the Nature both of Rock and Crystal, of a blue, white, black, and brown Colour, extremely hard and heavy; this Stone is called the *Matrix*. We must observe, that when once the Crystal is taken away, there never comes any other, although the *Matrix* be left in the same Place where it was found: And this has made some People think that Crystal was formed from the Beginning of the World. It happens sometimes that Pieces of Rocks fall down with the Ovens of Crystal contained in them, and roll upon the Ice. 'Tis for this Reason that the Countrymen often find Pieces of Crystal on the Surface of the Ice,

and ſometimes adhering to it, and even in the Current of the Water, which forces itſelf up thro' the Clefts of the Ice. There are ſome Places where the Cattle croſs over the Ice to go and feed at the Bottom of the Mountains, on the other Side of the Valley, in Places where the Sun can come, and where there is ſome Paſture, and they do it the more eaſily, becauſe the Surface of the Ice is ſprinkled over with Gravel, or ſmall Particles of Rock, which the Wind probably brings from the neighbouring Mountains. We found alſo upon the Ice many large Stones, which in my Opinion had fallen down from the Tops of the Mountains, altho' the People of the Place pretend that they were raiſed from the Bottom of the *Glacieres*. I have already obſerved, that the Valley of Ice has a Communication with the Valley of *Chamouny*, by five Openings, each of which has a Name, as will be ſeen in the Plan at the End of this Account. The *Glacieres* ſtretch by diverſe Openings and Vallies, as far as the Valley of *Courmayeu*, in the *Val d'Aoſte*, but not by an uninterrupted Communication as formerly, by reaſon of the falling down of ſome Pieces of the Mountain: And therefore it is impoſſible to go from *Chamouny* to *Courmayeu*, by the Valleys of the *Glacieres*. Of the five Openings which end in the Valley of *Chamouny*, that which is called the *Glacier des Bois* is the moſt conſiderable, not only for its Beauty and Largeneſs, but becauſe the River *Arbairon* has its Source there; it comes out from under the Ice, through two Arches all of Ice. 'Tis a Sight equally beautiful and extraordinary to ſee the Inequalities which riſe above theſe Paſſages more than 80 Feet in Height, and which appear to be the fineſt Cryſtal in the World, reflecting an infinite Number of bright Colours, juſt as if one looked through ſo many Cryſtals, as there are Excreſcencies of Ice. For you muſt imagine this Place, as compoſed of a vaſt Quantity of vertical Shoots, adhering to each other, and terminating unequally both above and below. 'Tis not without great Difficulty that we came to this Place, ſo worthy of Admiration; we were even forced to go thro' one of the Paſſages where the Water was not ſo abundant as at the other, and not without Danger, by reaſon of the Pieces of Ice which fall off ſometimes, which our Guides have ſeen happen.— The *Arbairon* is a large Stream which falls into the *Arve*; it comes from under theſe Arches, and carries along with it a vaſt many Particles of Gold, as the Goldſmith who was with us ſhewed us. The Rivulet of *Argentiere*, which comes from the *Glacier* of the

ſame

ſame Name, carries with it alſo Pieces of Gold and Silver, which has not been obſerved at the Source of the *Arve*. I imagaine that the *Arbairon* has another ſource beſides the melting of the Ice, becauſe the Water never fails no more than that of the *Arve*, which riſes in a Mountain, where there is neither Ice nor Snow in Summer. However that may be, the *Arve* and the *Arbairon* carry along with them a very fine and white Sand, which makes the Water look as if Soap had been diſſolved in it; it keeps this Colour, till it receives the *Nan de Bois* into it, of which I have already ſpoke. Which brings a very black Sand, that changes its Colour to a dark grey, which it keeps till it falls into the *Rhone* below *Geneva*. I imagine it may take along with this laſt mentioned Water ſome Gold Duſt, for we obſerved in croſſing this *Nan de Bois* a vaſt many Stones, which ſeemed to contain both Gold and Silver. All the *Glacieres*, at leaſt thoſe which are called the *Glacieres of Chamouny*, are ſituated on the left Side of the *Arve*; there is indeed a little one on the other Side, in the Mountain of *Valorſine*, but it is not conſiderable, and has no Communication with the reſt. Before I quit *Chamouny*, I'll ſay a Word concerning its natural Hiſtory. The Inhabitants of this Country are very good ſort of People, living together in great Harmony, they are robuſt, live to a great Age, and have very few Beggars among them; they don't begin to cultivate their Lands till the Spring, after the Snows are melted, which is ſometimes at the End of *April*, and ſometimes at the End of *May*; then they begin to Plough, and Sow their Grains, ſuch as Rye, Barley, Oats, Beans, and Buckwheat, which they reap in *September*. And of all theſe Grains they make a kind of Cake, which is very hard, becauſe they dry it in the Sun after it is baked, and they preſerve it thus many Months. They don't make uſe of Wheat but for Children, and that in very little Quantity. 'Tis ſurpriſing to ſee how the Mountains are cultivated, in Places that are almoſt perpendicular, where they Plough and Sow as cleverly as can be done on the Plains. This we firſt obſerved near *Salanches*. Fruits ripen very late in this Country, for we ſaw Cherries there which were not quite ripe, and we found Flowers and Fruits on the Mountain, which are never ſeen with us, but in the Spring. We obſerved, as we were going up the Mountain, a fine clear Mineral Water, partaking of Iron and Sulphur, it is very delicious and cool; their Honey is white, reſembling very much that of *Narbonne* for Colour, but not for Taſte. The Sheep which are

kept

kept near the *Glacier* lick the Ice, which ſerves them for drink; they are left without any one to watch them, there being in this Valley no Beaſt of Prey, though Bears, Wolves, and Foxes abound in the Country all about. Nothing inhabits here but *Chamois*, *Bouquetins*, who keep in the high Mountains, and a great Quantity of *Marmotes*; this is the Account the Inhabitants gave us of this Animal. They ſleep ſix Months of the Year, that is, all Winter, and in the Summer they provide a warm Couch againſt their Time of Sleeping; for this End they cut Herbs with their Teeth, and in order to carry them to their Holes one of them lays on its Back, and the others load it like a Cart, and then drag it by the Ears to the Hole. They pretend alſo that they provide againſt being ſurprized, by placing Centinels, who give them the Alarm by a whiſtling Noiſe; they eat theſe *Marmotes*, and find them very good, and uſe their Fat to burn in Lamps; there are no Birds of Prey in this Valley, nor Crows, neither are there ever any Swallows. I obſerved a remarkable kind of Graſshopper, much reſembling a Dragon Fly, with long Legs. We ſtaid at *Chamouny* from *Tueſday* Evening to *Thurſday* Morning; but I could make no more Experiment with my Barometer, becauſe it had been damaged. We went from thence, and lay at *Cluſe*, and from that Place to the Mountain called the *Maulè*, which I look upon to be ſomewhat higher than *Montanver*, becauſe we were half an Hour longer in going up it, although the Road is very even, as well as ſteeper. I wiſhed to have had my Barometer to take the Height of it, but I was forced to content myſelf when I got up to the Top to obſerve the Angle of Poſition of the *Glacieres*, with reſpect to *Geneva*, which I found to be 158 Degrees preciſely. I looked down on all the Objects about us with great Pleaſure; the Proſpect put me in mind of that fine Plan which you have ſeen in our Publick Library, for the Plain below, ſeen from this high Mountain, at firſt Sight gives one the ſame Idea. 'Tis wonderful to ſee thoſe Places, which we take to be nothing but high Mountains, divided by fine and fertile Valleys, covered with all ſorts of Trees and Fruit, an infinite Number of Villages, which being in deep Bottoms, appear from thence to be ſituated in a rural and agreeable Manner. In a word, all the Pains I took to clamber up this Mountain were ſufficiently recompenced by a Proſpect ſo beautiful and ſo uncommon. After having ſtayed in this Situation about half an Hour, we went down again, and continued our Journey. We lay at *Contamines*, from whence

whence we arrived at *Geneva*, *Satuday* Morning the 26th, all vaſtly well ſatisfied with our Journey, and without any other regret than not having ſtayed longer at *Chamouny*, to have conſidered the Beauties of the Places thereabouts. Thoſe who may hereafter be deſirous to undertake this troubleſome and curious Journey, ought to add to the Precautions which we have pointed out, that of imploying more time in it, and, if poſſible, to come round by *Switzerland*, which would be very eaſy from *Chamouny*. Nothing could be more agreeable than this Journey, by reaſon of the Rarity and Variety of Views which continually occur; but then it would be right to view the *Maulè* in going there. Suffer me, Sir, to addreſs this Account of our Voyage to you, as the Perſon to whom of right it belongs; you marked us out a way which was eaſy to follow by the Help of your Directions. I hope you'll pardon the Incorrectneſs of my Style, and want of Method in putting things together; I committed to Paper whatever occured to me and my Companions; 'tis Truth alone which can recommend theſe Papers, and 'tis that alone which can engage you to receive them favourably, and as a Mark of the ſincere Regard with which

I am,

SIR,

Your moſt Humble

and moſt Obedient Servant,

P. M.

P. S. In going up *Montainver*, through a very narrow and difficult Path, towards the *Glaciere de Bois*, we found ſome fine Plants, without either quitting our Guides, or our Company, or going out of the Path; namely, *Pyrola folio mucronato*; *Conſolida Saracenica minor Alpina*; *Alchymilla Alpina minor quinque-folia*; *Lamirum album Plinii*; *Aſclepias flore albo*; *Victorialis longa*; *Euphraſia Alpina luteis floribus*; *Meum Athamanticum*; *Carlina acaulis*; *Helleborus albus*; *Lapathum* of many Kinds. Not to mention many other Plants, which would rather make a Catalogue than a Relation of a Journey. All along this Mountain there are many kinds of Pine and Fir; there are alſo many Larch Trees in *Latin Larix conifera folio deciduo*; we found there ſome fine Agaric, and in the Trunks of ſeveral Larches there were Horizontal and Lateral Inciſſions, by which the *Italians* had extract-

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ed Turpentine. At the Source of the *Arbairon*, which is at the Foot of the *Glaciere de Bois*, in the Valley of *Chamouny*, and even in the Bed of this Source of the *Arve*, which was not covered with Water, we found the following Plants; namely, *Muſcus capillacius lanuginoſus denſiſſimus*; *Lythophyton album nodoſum*; *Sedum alpinum ſubhirſutum, coronâ floris purpuraſcente, diſco viridi*, and many other kinds of *Sedum*.

Compariſon of our Obſervations with thoſe of Mr. Fatio de Duillier, *which are inſerted in the* Appendix *to the* Hiſtory *of* Geneva, 4th Edit. Tom. II. pag. 450.

" THE Height of the Mountain called the *Maudite* is above " the Level of the Lake at leaſt 2000 *French Toiſes*, or " about 4374 *Engliſh* Yards."

I ſaid above, that we found the Height of the *Arve* at *Chamouny* 1520 *F.* above the Level of the *Rhone* at *Geneva*, and the Height of the higheſt Mountain 10939 *F.* above the *Arve* at *Chamouny*, which in all make above the *Rhone F.* 12,459. 5. 5. which being reduced to *Toiſes*, give 2076. 3. 5. $\frac{5}{7}$. Now Mr. *Fatio* has found it above 2000 *Toiſes* above the Level of the Lake, 7 Leagues above *Geneva*, where it muſt at leaſt be 50 Feet higher than *Geneva*; ſo I take it that we have correſponded pretty exactly in our Operations. It is to be remarked alſo, that Mr. *Fatio*'s Obſervation was made at 45 Miles from the Mountain, and mine juſt at the Foot, and conſequently much leſs ſubject to Refraction.

FINIS.

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Pl. 1st

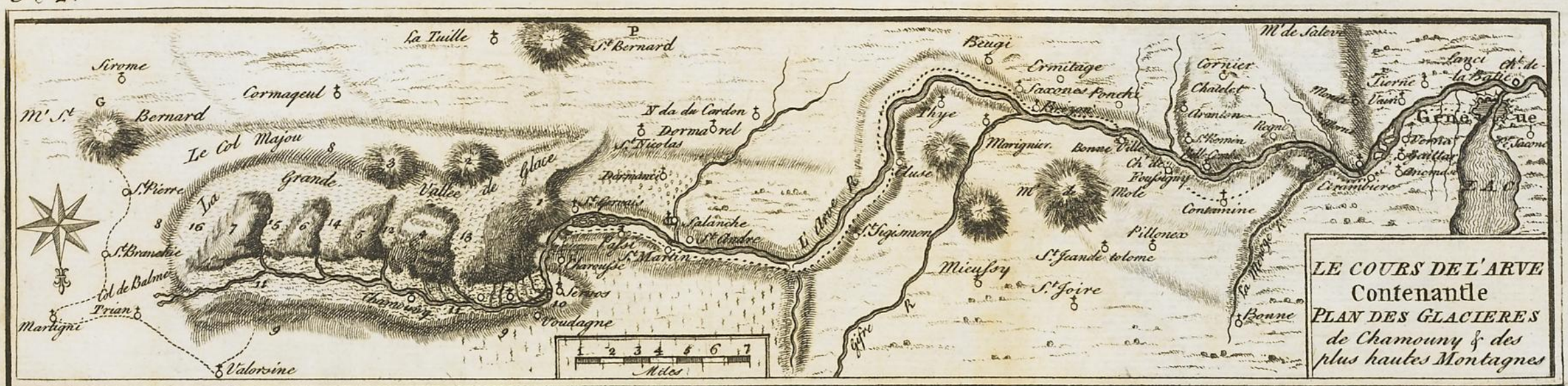
R. Price délin.

Vivares Sculpsit

View of y.e Ice Valley, & Mountains that Surround it, from Mount Anver .

in such a Manner on the Instrument, as to be easily compared one with the other.

Pl 2.d



1 Le Mont Blanc	5 Le Mont Logan	9 Le Mont de Valorsine	13 Le Glacier des Bossons	La hauteur de l'arve a la Bonne Ville Sur le Nivau du Rhone 403
2 Le Mont Malay	6 Le Mont Paiclerais	10 Le Pont Pelissier & les Montees	14 Le G. d'argentiere	La hauteur a Salanche 670 p. La hauteur a Servos 1306
3 L'Eguille du Dru	7 Le Mont du Tour	11 La Vallee de Chamouny	15 Le G. du Tour	La hauteur a Chamouny 1520
4 Le Montanvert	8 Le Mont des Echaus	12 Le Glacier des Bois	16 Le G. de Trian	La hauteur du Montanver Sur Chamouny 2427
				La hauteur du Mont Blanc 10939
				Le Mercure est descendu Sur le Montanver de 32 Lignes

Pl 3.d

VEÜE DE LA VALLÉE DE CHAMOUNY ET DES GLACIERES.

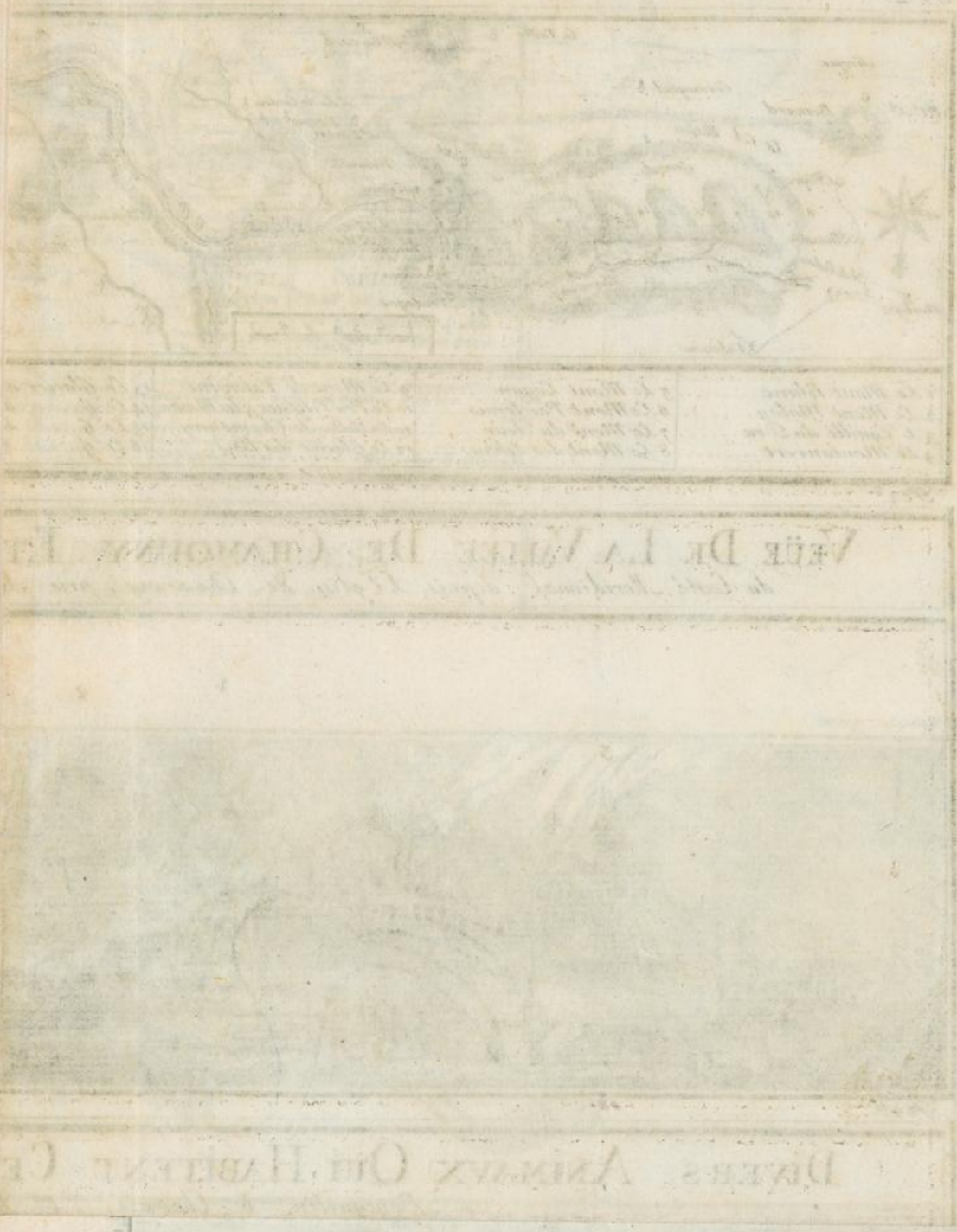
du Costé Meridional depuis L'Eglise de Chamouny, pris Sur les Lieux, L'an 1742.

Pl 4.th

DIVERS ANIMAVX QUI HABITENT CES MONTAGNES.

a Boucquetin b Chamois c Marmotte

P. Martel. Delin:



dif
in ſuch a Manner on the Inſtrument, as to be eaſily compared one with the other.

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GLACIERES IN SAVOY — MARTEL — 1744

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An account of the glacieres or ice Alps in Savoy, in two letters, one from an English gentleman to his friend at Geneva ; the other from Peter Martel, engineer, to the said English gntleman [sic!] ; ...

Windham, William

London, 1744

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